Performance Test of Pump Combination between Normetex Scroll and MB 601 Pumps

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The tritium compatible pumps play an important role in transporting the hydrogen isotopes as the main reactant of the nuclear fusion power plant. The various ranges of vacuum and throughput with highly leak tightness are required for handling of tritium gas and tritium-contaminated gases in the tritium plant. The limited number of tritium compatible pumps were proposed and applied in the worldwide tritium handling facilities. In many cases, the tritium compatible pumps were operated in the secondary contamination boundaries such as gloveboxes, radioactive-specified rooms, and so on.

The study is focused on the experimental performance test and modelling of the combination of Normetex scroll pump and metal bellows, MB 601, pump using helium and nitrogen gases, which are considered as the tritium compatible compact-size pumps. Until now, however, there is no enough performance test results of the Normetex scroll pump under the various suction and discharge pressure conditions. In this paper, the experimental test will be performed to verify the pumping performance of the Normetex scroll pump and the combination of the Normetex scroll pump and MB 601 pump, as a backing pump. For the Normetex scroll pump, the proper model will be selected based on the parametric study using the optimization techniques. The results will show the directions of pump combinations to satisfy the specific condition of the throughput and vacuum level in the tritium plant.